Docket:	:	A.09-09-022 et al.
Exhibit Number	:	
Reference Number	:	ORA-01
Commissioner	:	M. Guzman Aceves
ALJ	:	H. Yacknin
Witness	:	C. Mee

OFFICE OF RATEPAYER ADVOCATES

CALIFORNIA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY

APPLICATION OF SOUTHERN CALIFORNIA EDISON COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE ALBERHILL SYSTEM PROJECT

APPLICATION OF SOUTHERN CALIFORNIA EDISON COMPANY FOR A PERMIT TO CONSTRUCT ELECTRICAL FACILITIES WITH VOLTAGES BETWEEN 50KV AND 200KV: VALLEY-IVYGLEN 115 KV SUBTRANSMISSION LINE PROJECT

San Francisco, California
August 28, 2017

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I. INTRODUCTION AND SUMMARY

As shown in Figure 1 in Appendix C, the Valley Substation currently contains five transformers, each with a capacity of 560 megavolt-amps (MVA), to step down electric power voltage from the 500 kilovolt (kV) bus to 115 kV bus. The 115 kV bus is divided into three sections:

1) Section "AB," with two 560 MVA transformers, serves the Valley North System;
2) Section "C," with one spare 560 MVA transformer, does not serve any load; and
3) Section "D," with two 560 MVA transformers, serves the Valley South System.

The Valley South System is a 115 kV local network that includes seven 115 kV sub-transmission lines[1] derived from Section "D," supplying power to 14 substations.[2]

On January 16, 2007, Southern California Edison Company (SCE) filed Application (A.) 07-01-031 to construct the Valley-Ivyglen project (VIG). The VIG project includes the following project components:[3]

- Construction of a new, single-circuit 115-kV sub-transmission line and fiber optic line. The route of the proposed VIG project would be approximately 27 miles long and constructed within approximately 23 miles of new Right-of-Way (ROW).
- Installation of overhead fiber optic lines on the proposed structures and underground in new (approximately 10,000 feet) and existing (approximately (13,200 feet) conduit.
- Transfer of existing distribution circuits along portions of the proposed sub-transmission line to new 115-kV structures or to underground positions; and

[1] The seven substation lines include the Valley–Triton line that was recently approved by the Commission in Decision (D.) 16-12-001.

[2] The fourteen substations are Ivyglen, Fogarty, Elsinore, Skylark, Newcomb, Tenaja, Stadler, Stent, Moraga, Pechanga, Pauba, Triton, Auld, and Sun City substations.

[3] Final EIR at 2-1.

- Installation of new 115-kV switching and protective equipment at Valley and Ivyglen Substations.

With the construction of VIG, both the Ivyglen and Fogarty substations would be looped in with other substations to improve power supply flexibility and reliability.

On August 17, 2010, the Commission, in D.10-08-009, issued a permit to construct (PTC) for the construction of the VIG project.

On May 23, 2014, SCE filed a petition to modify D.10-08-009 to allow modifications to the design and construction of the approved VIG project.

On September 30, 2009, SCE filed its Alberhill System Project (ASP), A.09-09-022. Based on SCE's testimony, the ASP includes the following main project components: [4]

- Construction of a new 1,120 MVA 500/115 kV substation to increase electrical capacity to the area presently served by the Valley South 115 kV System;
- Construction of two new 500 kV transmission line segments to connect the new substation to SCE's existing Serrano-Valley 500 kV transmission line;
- Construction of a new 115 kV sub-transmission line (approximately three miles);
- Construction of 17 miles of double-circuit 115 kV sub-transmission line (from the existing single circuit line); and
- Installation of telecommunications improvements to connect the new facilities to SCE's telecommunication network.

With the construction of ASP, SCE would transfer five existing 115/12 kV substations (Ivyglen, Fogarty, Elsinore, Skylark, and Newcomb) presently served by the Valley South System to the new Alberhill System.

SCE's most recent cost estimate for the ASP-only project is $464 million (in constant 2017 dollars).[5] SCE did not provide a cost estimate for the VIG project.

[4] SCE's July 7, 2017 Direct Testimony at p. 19.

[5] SCE's July 7, 2017 Direct Testimony at p. 22.

On May 23, 2014, almost four years after D.10-08-009 approved the VIG project, SCE filed a Petition for Modification (PFM) of D.10-08-009 to modify the design and construction of the VIG project. SCE asserted in its PFM that modification is needed to comply with the Commission's General Order 95, to account for topography constraints, facilitate efficient construction and maintenance, to reduce the number of pole replacements, and to minimize impacts to jurisdictional drainages and sensitive species, among other factors.

Figure 2 in Appendix C is an illustration of the proposed VIG project and ASP (Proposed Projects).

On June 19, 2017, the VIG and ASP proceedings were consolidated and parties were directed to submit testimony on, among other things, the need for the proposed projects.[6]

ORA submits the following:

1. SCE's load forecast cannot be relied upon to determine the need for the Proposed Projects;
2. SCE should be ordered to implement ORA's Option 1 (described below) to increase power supply flexibility and reliability for the Valley South System;
3. If the Commission does not approve Option 1, then the Commission should order SCE to implement ORA's Option 2 (described below) to install a sixth transformer at Valley Substation; and
4. If the Commission finds that Alberhill Substation must be constructed, the Commission should order SCE to implement ORA's Option 3 (described below) to eliminate two project components from the Proposed Projects.

[6] Assigned Commissioner's Scoping Memo and Ruling issued June 19, 2017, at pp. 1, 5-6.

II. ENERGY EFFICIENCY AND GROWTH OF DISTRIBUTED ENERGY RESOURCES CONTINUE TO DEPRESS LOAD GROWTH AND THE COMMISSION SHOULD TAKE ADVANTAGE OF INFRASTRUCTURE DEFERRAL OPPORTUNITIES OFFERED BY DISTRIBUTED ENERGY RESOURCES

Consistent with sound planning and the state's environmental goals, any load forecast should properly account for energy efficiency and distributed energy resources (DER)[7] programs by deferring infrastructure projects where possible. For example, in both its 2015-2016 Transmission Plan[8] and 2016-2017 Transmission Plan,[9] the CAISO cancelled dozens of transmission projects that it determined were no longer needed. Similar cancellations or deferrals have occurred in other high-DER states as well.[10] A 2016 report from the California Energy Commission (CEC) also provides significant detailed information on possible avoided transmission and the benefits of avoided costs from DER deployment.[11]

The Commission should defer infrastructure projects where reasonably possible. In Rulemaking 14-10-003 (Order Instituting Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Demand-Side Resource Programs) the Commission discussed a similar concept, stating:

[7] Throughout this testimony the terms "Distributed Energy Resources", "DER", and "Preferred Resources" are used interchangeably and have equivalent meaning.

[8] 2015-2016 ISO Transmission Plan, page 93. See: http://www.caiso.com/Documents/Board-Approved2015-2016TransmissionPlan.pdf.

[9] 2016-2017 ISO Transmission Plan, page 102. See: http://www.caiso.com/Documents/Board-Approved_2016-2017TransmissionPlan.pdf.

[10] http://www.utilitydive.com/news/new-york-utility-turns-to-ders-to-avoid-118m-substation-upgrade/422599/.

[11] San Joaquin Valley Distributed Energy Resource; Regional Assessment. July 2016. See: http://www.energy.ca.gov/2016publications/CEC-200-2016-004/CEC-200-2016-004.pdf.

> Public Utilities Code Section 454.5(b)(9)(c), the California Energy Action Plan, and past Commission decisions have established policies to procure all available cost-effective demand reduction and energy efficiency resources before procuring generation resources. Furthermore, Public Utilities Code Section 701.1(a) directs the Commission "to minimize the cost to society of the reliable energy services that are provided by natural gas and electricity, and to improve the environment and to encourage the diversity of energy sources through improvements in energy efficiency and renewable energy resources."[12]

Considering the development of DERs, the ASP may be cancelled, modified, or deferred due to the success of the state's DER programs.

According to SCE, recorded peak demand at the Valley South System in year 2016 was 996 MVA.[13] By SCE's projections, the 1-in-5 year peak demand for the Valley South System in year 2021 will be 1129 MVA, which will exceed 1120 MVA – the capacity of the two Section "D" transformers. However, the 1129 MVA peak demand is a gross peak demand, which did not consider the offset effects of "behind the meter generation" because SCE asserted that "behind the meter generation" is not dependable.[14] But the CAISO, in its 2016-2017 transmission plan, included "behind the meter generation" to offset the peak demand.[15] As a result, CAISO forecasted that net peak demand at Valley South System in year 2021will be 956 megawatts (MW). Assuming a unity power factor,[16] the 956 MW approximately equates to 956 MVA. CAISO further

[12] Rulemaking 14-10-003, issued Oct. 8, 2014, at 1-2.

[13] Please see Table 1 in Appendix B to this testimony.

[14] SCE response to ORA 4th data request , Question 01.

[15] CAISO 2016-2017 TPP at 1.

[16] An alternating current power supply system delivers apparent power with the measurement unit of Mega-Volt-Ampere or MVA. This apparent power consists of two components: real power with the measurement unit of Mega-Watt or MW and reactive power with the measurement unit of Mega-Volt-Ampere Reactive or MVAR. The ratio of the real power (in MW) to the apparent power (in MVA) is defined as the power factor. Demand for reactive power (in MVAR) at a local system can be

forecasted that net peak demand for the Valley South System in year 2026 will be 950 MW. Assuming a unity power factor, the 950 MW approximately equates to 950 MVA. With these considerations, the net peak demand that needs to be served by the two Section "D" transformers will be decreased due to the ever increasing penetration of preferred resources including "behind the meter generation".

In conclusion, the load forecasting estimates that SCE relies on to justify transmission additions to the Valley South System are inconsistent with the current CAISO transmission plan. Therefore, the Commission should not rely on SCE's load forecast results to determine the need for new transmission projects. According to the CAISO's studies, the peak demand in the Valley South System is decreasing rather than increasing so the overload concern for the two Valley Substation Section "D" transformers is overstated.

III. THE PROPOSED PROJECTS ARE NOT NEEDED.

In its application, SCE states that overload of the two Section "D" transformers at the Valley Substation is one of the motivating concerns for the construction of the Alberhill Substation.[17] ORA observed, however, that SCE's overload concerns are based on ignoring the power supply capability of the preferred resources, including energy efficiency, energy storage, and behind the meter generation. Because there is no overload concern, SCE's Proposed Projects are not needed to address overload concerns.

In reviewing SCE's Proposed Projects, ORA also identified some technical issues:

- Total peak demand of the five substations that would be served by the Alberhill Substation was only 336 MVA in year 2016. Therefore, one transformer that has power transfer capability of 560 MVA would have the utilization factor of 60%, which is

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supplied or compensated by local installation of reactive power compensators such as shunt capacitors. In this way, the need for reactive power from the high voltage grid can be minimized, and the power flowing through the transformers will be only real power but not reactive power. When there is no reactive power flowing through the transformers, the measurement of real power will equal to the measurement of apparent power. This will result in the power factor equal to one (1)----Unity Power Factor.

[17] SCE Application at 2.

sufficient to serve the five substations. SCE proposed to install two transformers at Alberhill Substation, with load power transfer capability of 1120 MVA. Therefore, under SCE's proposal, the utilization factor will be less than 30%. In other words, SCE is over investing ratepayer money for an unneeded transmission facility;

- Under the Proposed Projects, there would be five idle tie-lines between the newly constructed Alberhill System and the existing Valley South System. If there is an outage on either one of the systems, the other system can be used as back up to supply power through the five tie-lines. With this strong back up capability, there will be no need for the second transformer at Alberhill Substation;
- Constructing the Valley–Ivyglen line will lead to the existing Valley leg of the Valley-Elsinore-Fogarty three-terminal line, approximately 13 miles long, resulting in the line not being used most of the time.

In summary, SCE's Proposed Projects should be refined to include only those elements that are needed.

IV. THE COMMISSION SHOULD CONSIDER THREE ALTERNATIVE OPTIONS

ORA agrees there are some power supply flexibility and reliability issues in the Valley South System. Therefore, ORA proposes three cost-effective options to address those issues:

Option 1: Loop in Fogarty and Ivyglen Substations

Among the 14 substations[18] in the Valley South System, Ivyglen and Fogarty Substations are served radially – they have only one source line. If the Fogarty leg of the Valley-Elsinore-Fogarty three-terminal line is interrupted, both Ivyglen and Fogarty Substations will lose power completely. In order to improve the power supply flexibility and reliability for these two substations, ORA proposes Option 1 as illustrated in Figure 3 in Appendix C. The Commission can order SCE to construct the following components:

[18] The fourteen substations are Ivyglen, Fogarty, Elsinore, Skylark, Newcomb, Tenaja, Stadler, Stent, Moraga, Pechanga, Pauba, Triton, Auld, and Sun City substations.

1. Re-conductor the Valley leg of the Valley-Fogarty-Elsinore three-terminal line to higher capacity, disconnect this leg from the tap point, and extend it to Ivyglen Substation, so this leg will become the Valley–Ivyglen line, looping in the Fogarty and Ivyglen Substations. Since this line is approximately 27 miles long, SCE should use conductors that have low resistance and inductance to minimize voltage drop on this line.
2. Re-conductor the Valley leg and Skylark leg of the Valley-Skylark-Newcomb three-terminal line to carry power for Newcomb, Skylark and Elsinore substations, SCE should ensure these two legs have sufficient power transfer capability.

Under this option, the two Valley Section "D" transformers continue to serve the 14 substations in the Valley South System.

Based on recorded peak demand in year 2016, the peak demand of the Valley South System in year 2016 was 996 MVA.[19] Table 1 in Appendix B shows that the utilization factor for the two Section "D" transformers will be not more than 89%. Due to ever-increasing development of preferred resources including energy efficiency, distributed generation, and demand response at the Valley South System, the peak demand at Valley South System will be decreased. Consequently, due to the current utilization factor and the development of DERs that have not been accounted for, there is no overload concern.

Because the CAISO forecast predicts decreased load, the probability of a load increase actually occurring is very low. If load increase does occur, it would be for a short duration. If as a result of a load increase, an overload does occur, SCE can close the section circuit breaker between Section "D" and Section "C," so that the spare transformer at Section "C" can be used for that short time period to mitigate the overload scenario.

In conclusion, Option 1 is a feasible plan because 1) the Section "D" transformers will not be overloaded, and 2) this option would meet the purpose of increasing power

[19] In SCE's response to ORA's data request, ORA-A.09-09-022-SCE012, SCE made corrections to Elsinore Substation's recorded peak demand for year 2016 and confirmed other substations' recorded 2016 peak demand.

supply flexibility and reliability. Option 1 also requires no new ROW for the line re-conductoring or for the line extension.

Option 2: Install a Sixth Transformer at Valley Substation.

If the Commission does not approve Option 1, the Commission can order SCE to install a sixth transformer (560 MVA) at Valley Substation. Figure 4.1 in Appendix C provides an illustration of this option. Option 2 consists of the following project components:

1) Construct a 115 kV bus at Section "E" at Valley Substation;
2) Install a sixth transformer (500/115 kV 560 MVA), connecting Valley 500 kV bus and the Valley 115 kV bus Section "E";
3) Re-conductor the Valley leg of the Valley-Elsinore-Fogarty line to a higher capacity, disconnect it from the tap point, and extend it to Ivyglen Substation. At the Valley Substation end, shift this line from 115 kV bus Section "D" to the newly constructed Section "E";
4) Construct the Newcomb–Skylark 115 kV line with a higher capacity,
5) Re-conductor the Valley–Newcomb line to a higher capacity and shift this line from 115 kV bus Section "D" to the newly constructed Section "E";
6) Shift the Skylark-Tenaja line from Skylark 115 kV bus to the Skylark leg of the Valley-Skylark-Newcomb three-terminal line to form the Valley-Tenaja-Skylark-Newcomb four-terminal line. Set the circuit breaker at Newcomb Substation for the Newcomb leg of the Valley-Tenaja-Skylark-Newcomb line as "Normal Open," and also set the circuit breaker at Skylark Substation for the Skylark leg of the Valley-Tenaja-Skylark-Newcomb line as "Normal Open." As a result, the two "Normal Open" legs would become two tie-lines between 115 kV bus Section "D" and Section "E."

Under this option, the five substations[20] would be connected through the newly formed loop. The Section "E" transformer (the sixth transformer) would supply power to

[20] The five substations are Ivyglen, Fogarty, Elsinore, Skylark, and Newcomb substations.

the five substations under normal conditions.[21] The two Section "D" transformers serving the remaining nine substations would be significantly relaxed.[22]

If there is a one line outage (N-1)[23] on the Section "E" loop that serves the five substations, SCE could close either one of the two tie-lines, so the two Section "D" transformers can supply part of the load to the five substations.[24] If an N-1 outage happens at the Section "D" system, these two tie-lines also could be used for power flow from Section "E" to Section "D." SCE also could close the section circuit breaker between Section "D" and Section "E" for power flow sharing when necessary. In conclusion, Option 2 addresses the overload concerns, if any, for the two Section "D" transformers, and also maintains the power supply flexibility and reliability for the entire Valley South System.

The Valley Substation has sufficient physical space for a sixth transformer. Based on ORA's preliminary analysis that was subsequently confirmed by a December 7, 2016 site visit to the Valley Substation, ORA identified multiple on-site locations where a sixth transformer could be located and space limitations within the substation do not appear to be a concern. Figure 4.2 in Appendix C presents a sketch of potential transformer locations. Additionally, the Valley Substation is not in a highly developed area and there are lightly- or undeveloped parcels to the east, south, and west of the station. Therefore, SCE may have options to build in the underdeveloped parcels if the Commission does not authorize the installation of a sixth transformer within the existing Valley Substation

[21] The five substations are Ivyglen, Fogarty, Elsinore, Skylark, and Newcomb substations with total demand of 336 MVA in 2016 based on recorded data in year 2016 provided by SCE. Comparing to transformer capacity of 560 MVA, the capacity factor would be 60%.

[22] The nine substations are Tenaja, Stadler, Stent, Moraga, Pechanga, Pauba, Triton, Auld, and Sun City substations with total demand of 660 MVA based on recorded data in year 2016 provided by SCE. Comparing to the two transformer capacity of 1120 MVA, the capacity factor would be 59%.

[23] For a local network like the Valley South System, SCE is to maintain power supply when there is one sub-transmission line outage to the Valley South System according to SCE's general distribution planning practice. In short, this is called N-1.

[24] The five substations are Ivyglen, Fogarty, Elsinore, Skylark, and Newcomb substations.

footprint. Figure 4.3 in Appendix C provides more information regarding the parcels surrounding the Valley Substation.

Option 3: Construct Alberhill Substation without Two SCE-proposed Project Components

ORA opposes the construction of the Alberhill Substation because it is not needed based on recorded load level and forecasted development of DERs such as energy efficiency, distributed generation, demand response, and energy storage that will lead to a net load decrease on the Valley South System.

However, if the Commission ultimately determines that the Alberhill Substation must be constructed, ORA proposes to eliminate the following two components from SCE's proposed projects:

1) Installation of the second transformer at the Alberhill Substation;
2) Construction of the second Valley leg of the Valley-Elsinore-Fogarty three terminal line, approximately 13 miles.

After eliminating the above two components, there would be four tie-lines between the Alberhill System and the Valley South System, so there would be no need for the second transformer at Alberhill Substation as proposed by SCE. If the operating transformer at Alberhill Substation is out of service, SCE could restore power supply to the five substations through the tie-lines. These tie-lines would maintain the power supply flexibility and reliability for both the Alberhill System and the Valley South System. Figure 5 in Appendix C illustrates the remaining components after the two SCE-proposed project components are eliminated.

Constructing a second Valley leg of the Valley-Elsinore-Fogarty line, then setting the original Valley leg idle is not an economical approach, as discussed below. Furthermore, it creates unnecessary environmental impacts and increases ratepayer costs.

With the elimination of the above two project components, Option 3 still meets the two project objectives: overload mitigation, and maintaining power supply flexibility and reliability. Option 3 is also feasible because its scope is within the scope of the Proposed Projects.

V. ORA'S COST ESTIMATION FOR THE THREE OPTIONS:

In its July 7, 2017 direct testimony, SCE updated the cost estimation for ASP, but did not update the cost estimate for VIG. On August 22, 2017, ORA tendered Data Request No. ORA-A.09-09-022-SCE012 to SCE seeking details of the cost estimation for VIG. In SCE's response, SCE did not provide cost estimates for the VIG project and asserted that "… cost estimates for the VIG project are not required, as it is a PTC, not a CPCN."[25] In the same data request, ORA also requested SCE to provide cost estimates for ORA's three options. SCE also did not provide a cost estimate for ORA's three options. [26]

Based on SCE's cost estimates for ASP, ORA also developed our own cost estimates for ORA's three options. Table 2 in Appendix B presents ORA's cost estimates.

ORA's preliminary cost estimation is based on the following assumptions:

- Installation of the 500 kV/560 MVA transformer will cost $30 million.
- Sub-transmission line construction will be $5.039 million per mile.
- For ASP, the new sub-transmission line will be 18 miles.
- For VIG, the new sub-transmission line will be 27 miles.
- For ORA's Option 1, the new sub-transmission line will be 30 miles.
- For ORA's Option 2, the new sub-transmission line will be 41 miles.
- For ORA's Option 3, the new sub-transmission line will be 32 miles.

Based on the above assumptions, ORA's cost estimation is as following:

- ASP would cost $464 million, VIG would cost $174 million, so the total cost for SCE's Proposed Projects would be $637 million;
- ORA's Option 3 would cost $534 million;
- ORA's Option 2 would cost $358 million;
- ORA's Option 1 would cost $250 million.

[25] SCE's response to ORA-A.09-09-022-SCE012, Question 4.

[26] SCE's response to ORA-A.09-09-022-SCE012, Questions 1, 2, and 3.

VI. SUMMARY AND CONCLUSION

In summary:

- SCE's load forecast cannot be relied upon for the need of the Proposed Projects;
- The Commission should order SCE to implement ORA's Option 1 to increase power supply flexibility and reliability for the Valley South System;
- If the Commission does not approve Option 1, then the Commission can order SCE to implement ORA's Option 2 to install a sixth transformer at Valley Substation; and
- If the Commission finds that Alberhill Substation must be constructed, the Commission should order SCE to implement ORA's Option 3 to eliminate two project components from the Proposed Projects.

APPENDIX A

QUALIFICATIONS OF WITNESS

PREPARED TESTIMONY
OF
CHARLES MEE

Q1: Please state your name and business address

A1: My name is Charles Mee and my business address is 505 Van Ness Avenue, San Francisco, California 94102.

Q2: By whom are you employed and in what capacity?

A2: I am employed by the Office of Ratepayer Advocates as a Senior Utilities Engineer – Specialist.

Q3: Please describe your related educational and professional experience.

A3: In 1984, I graduated from Tsinghua University in Beijing, China, with a Bachelor of Science degree in Electrical Engineering.

From 1984 to 1998, I worked for Henan Electric Power Test and Research Institute in Henan Province, China, as an Assistant Electric Power Engineer and performed the following tasks:

- Conducted technical research on electrical power equipment such as transformers, transmission lines, circuit breakers, and insulators for their electrical characteristics.
- Measured and analyzed operational over-voltages of the Henan Province electric power grid and recommended solutions in mitigating the over-voltages.

From 1988 to 1992, I worked for Hainan Province Electric Power Company in Hainan Province, China, as an Electric Power Engineer and performed the following tasks:

- Monitored insulation level of high voltage generators, transformers, and circuit breakers. Monitored operational over-voltages of the high voltage equipment and the electric power grid.
- Drafted testing plans and testing reports. Supervised testing of power devices including generators, transmission lines, transformers, and circuit breakers.
- Coordinated on the operation and maintenance of power transmission and power generation facilities.

- Coordinated on the planning, budgeting, engineering, building, and commissioning of new generators, power transmission lines, and power substations.

From 2002 to 2010, I worked for California Department of Water Resources in Sacramento, California, as an Associate Hydroelectric Power Utility Engineer and Senior Hydroelectric Power Utility Engineer – Supervisor, and performed the following duties:

- Participated in the California Independent System Operator ("CAISO") stakeholder processes including plan, design, and implementation of the Market Redesign and Technology Upgrade. Provided comments in the areas of the day-ahead and real time markets, energy and ancillary services co-optimization, residual unit commitment, congestion management, locational marginal pricing, market power mitigation, grid reliability, resource adequacy, and demand response.
- Participated in the CAISO transmission planning processes, generator interconnection procedures, local capacity requirement studies, transmission access charges, and grid management charges.
- Intervened in transmission owners' tariff filings on existing transmission contracts, transmission owner tariffs, and reliability services tariffs.
- Conducted the following studies related to State Water Project (SWP) operation: transmission and interconnection planning, existing power and transmission contracts benefit cost analysis, transmission cost forecasting, SWP capabilities in providing ancillary services to the CAISO market, cost impact of the CAISO proposals to SWP power operation, SWP resource modeling, and settlement and reconciliation for the CAISO market transactions.

From November 2010 to February 2013, I worked for the Energy Division of the California Public Utilities Commission as a Senior Utilities Engineer – Specialist and performed the following tasks:

- Commented on the CAISO power market refinement including renewable resources integration and market power mitigation.
- Facilitated settlement on distributed resources interconnection to utilities' distribution systems.

- Drafted resolution on utilities' tariff filings on power generators' station power services and on utilities' minor transmission and distribution construction and maintenance projects.

From February 2013 to present, I have worked for the Office of Ratepayer Advocates as a Senior Utilities Engineer – Specialist and have performed the following tasks:

- Project coordinator for ORA in the Tehachapi Reliability Transmission Project proceeding, Application (A.) 07-06-031.
- Project coordinator for ORA in the Alberhill System Project proceeding, A.09-09-022.
- Project coordinator for ORA in the South Orange County Reliability Enhancement Project proceeding, A.12-05-020.
- Project coordinator for ORA in the Coolwater – Lugo Transmission Project proceeding, A.13-08-023.
- Project coordinator for ORA in the Mesa Substation Project proceeding, A.15-03-003.
- Project coordinator for ORA in the Riverside Transmission Reliability Project proceeding, A.15-04-013.
- Project coordinator for ORA in the Suncrest Substation 300 MVAR SVC Project proceeding, A.15-08-027.
- Project coordinator for ORA in the Circle City Project proceeding, A.15-12-007.

Q4: What is the purpose of this testimony?

A4: I am the sponsor of ORA's Prepared Testimony in the SCE Valley—Ivyglen Project and Alberhill System Project proceedings, A.07-01-031 and A.09-09-022.

Q5: Does this complete your testimony?

A5: Yes, it does.

APPENDIX B

APPENDIX B

Table 1: Valley South System Capacity Factor

	2016 Recorded Peak Demand*	Transformer Capacity & Utilization Factor	
Substation	**(MVA)**	**(MVA)**	**(MVA)**
Ivyglen	43	**560**	**1120**
Fogarty	33		
Elsinore	81		
Skylark	65		
Newcomb	114		
Subtotal	**336**	**60%**	**30%**
Sun City	47		
Tenaja	48		
Stadler	106		
Stent	7		
Auld	130		
Moraga	130		
Triton	50		
Pauba	44		
Pechanga	98		
Subtotal	**660**		**59%**
Total	**996**		**89%**

* Based on SCE response to Data Request ORA-SCE-012.

Option 1: Two transformers serve 14 substations, utilization factor would be not more than 89%.

Optioin 2: One transformer at Section "E" serves five substations, utilization factor would be not more than 60%; two transformers at Section "D" serve nine substations, utilization factor would be not more than 59%.

Option 3: One transformer at Alberhill Substation serves five substations, utilization factor would be not more than 60%, two transformers at Valley Substation Section "D" serve nine substations, utilization factor would be not more than 59%.

SCE Proposed Projects: Two transformers at Alberhill Substation serve five substations, utilization factor would be not more than 30%, two transformers at Valley Substation Section "D" serve nine substations, utilization factor would be not more than 59%.

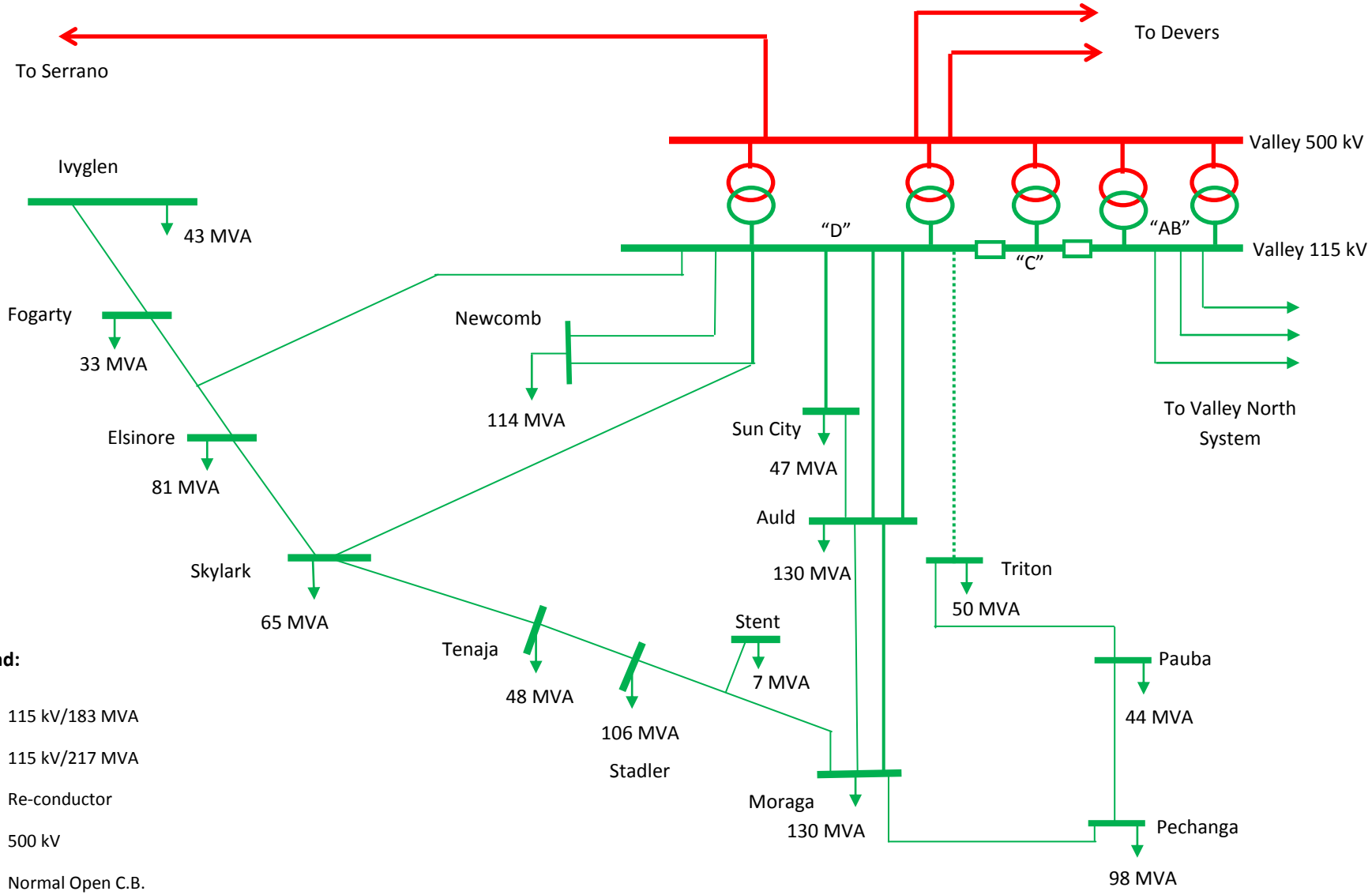
Table 2: ORA's Conceptual Cost Estimation for ORA's Three Options

Assumptions:						
500 kV Transformer Installation	$million	30				
Subtransmission (<200 kV) cost	$million/mile	5.039				
Subtransmission (<200 kV) miles	ASP**	18				
	VIG	27				
	ORA Option 1**	30				
	ORA Option 2**	41				
	ORA Option 3**	32				
	SCE's Estimation	**ORA's Estimation**				
	ASP*	**VIG**	**ASP/VIG**	**Option 3**	**Option 2**	**Option 1**
Licensing	25.5	10.0	35.5	35.5	35.5	35.5
Substation	187.6		187.6	157.6	30.0	
Transmission (>200 kV)	56.2		56.2	56.2		
Subtransmission (<200 kV)	90.7	122.4	213.1	161.2	206.6	151.2
Distribution	3.1		3.1	3.1	3.1	3.1
Telecommunicatioins	5.8	5.8	11.6	11.6	11.6	11.6
Construction Management	17.9	6.7	24.6	20.3	13.1	8.6
Environmental	23.8	8.9	32.7	27.0	17.4	11.5
Corp Security	3.6	1.3	4.9	4.1	2.6	1.7
Contingency	49.4	18.5	67.9	56.8	38.2	26.6
	463.6	173.7				
Total			**637.3**	**533.5**	**358.1**	**249.9**

* Based on SCE's July 7, 2017 testimony at page 22.
** Based on SCE response to ORA DR-012.

APPENDIX C

Figure 1 Existing Valley South System



1. The Existing Valley South System includes the Valley South Project that has been approved by the Commission Decision 16-12-001.
2. Load in each substation is based on year 2016 recorded data provided by SCE.

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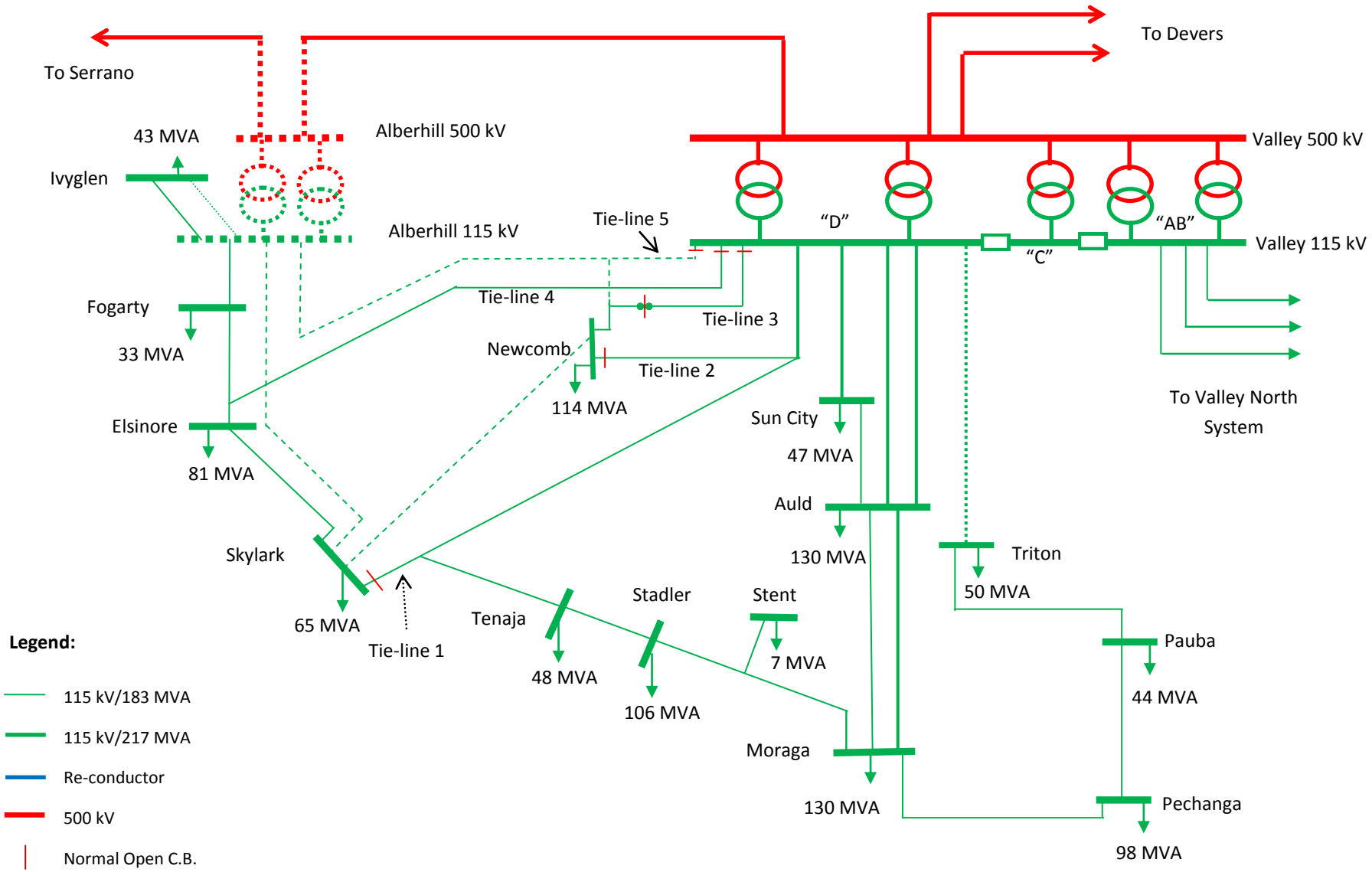
Figure 2 SCE Proposed Valley-Ivyglen and Alberhill Projects



1. The Existing Valley South System includes the Valley South Project that has been approved by the Commission Decision 16-12-001.
2. Load in each substation is based on year 2016 recorded data provided by SCE.

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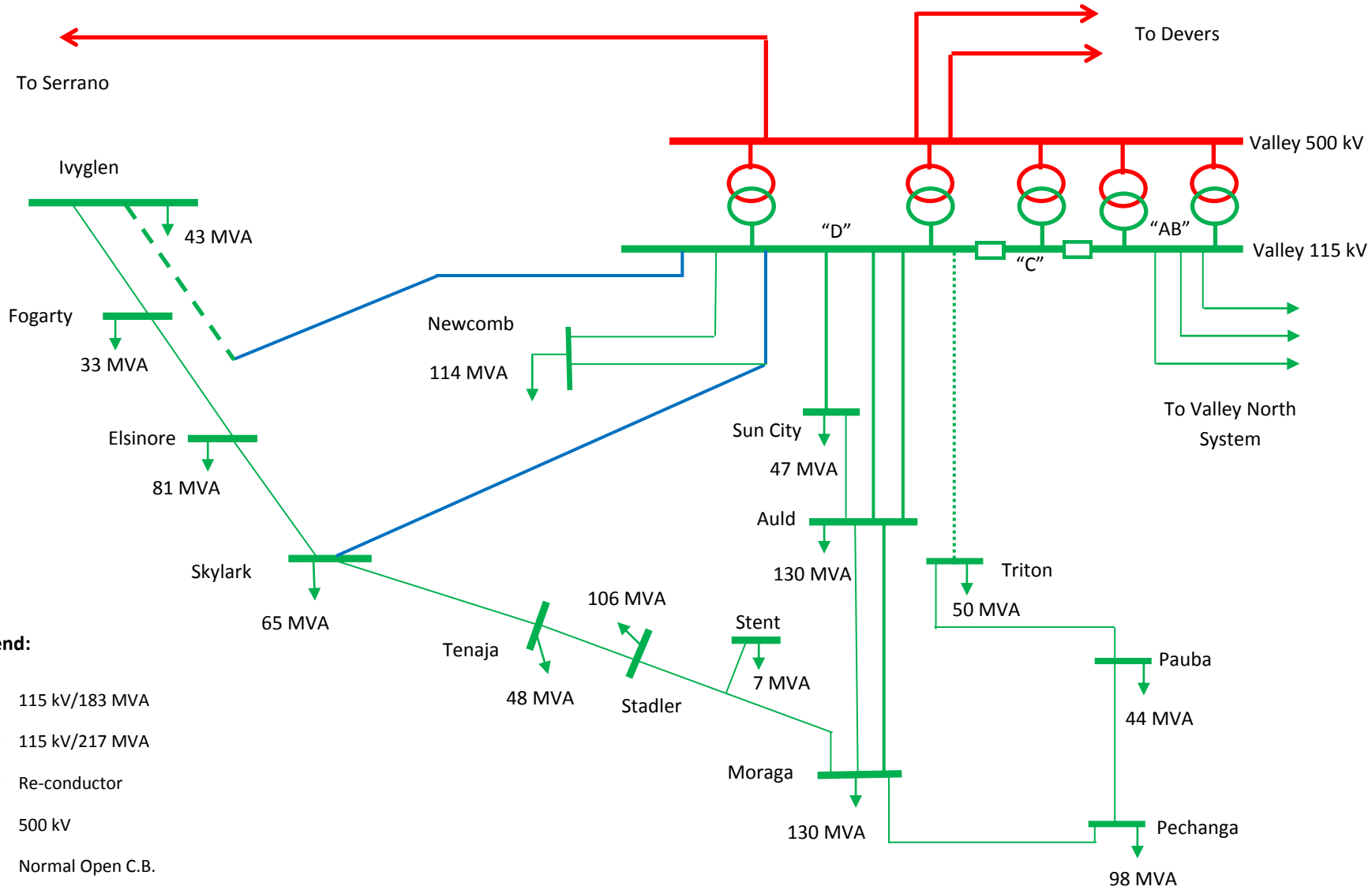
Figure 3 Option 1: Loop in Fogarty and Ivyglen Substations



1. The Existing Valley South System includes the Valley South Project that has been approved by the Commission Decision 16-12-001.
2. Load in each substation is based on year 2016 recorded data provided by SCE.

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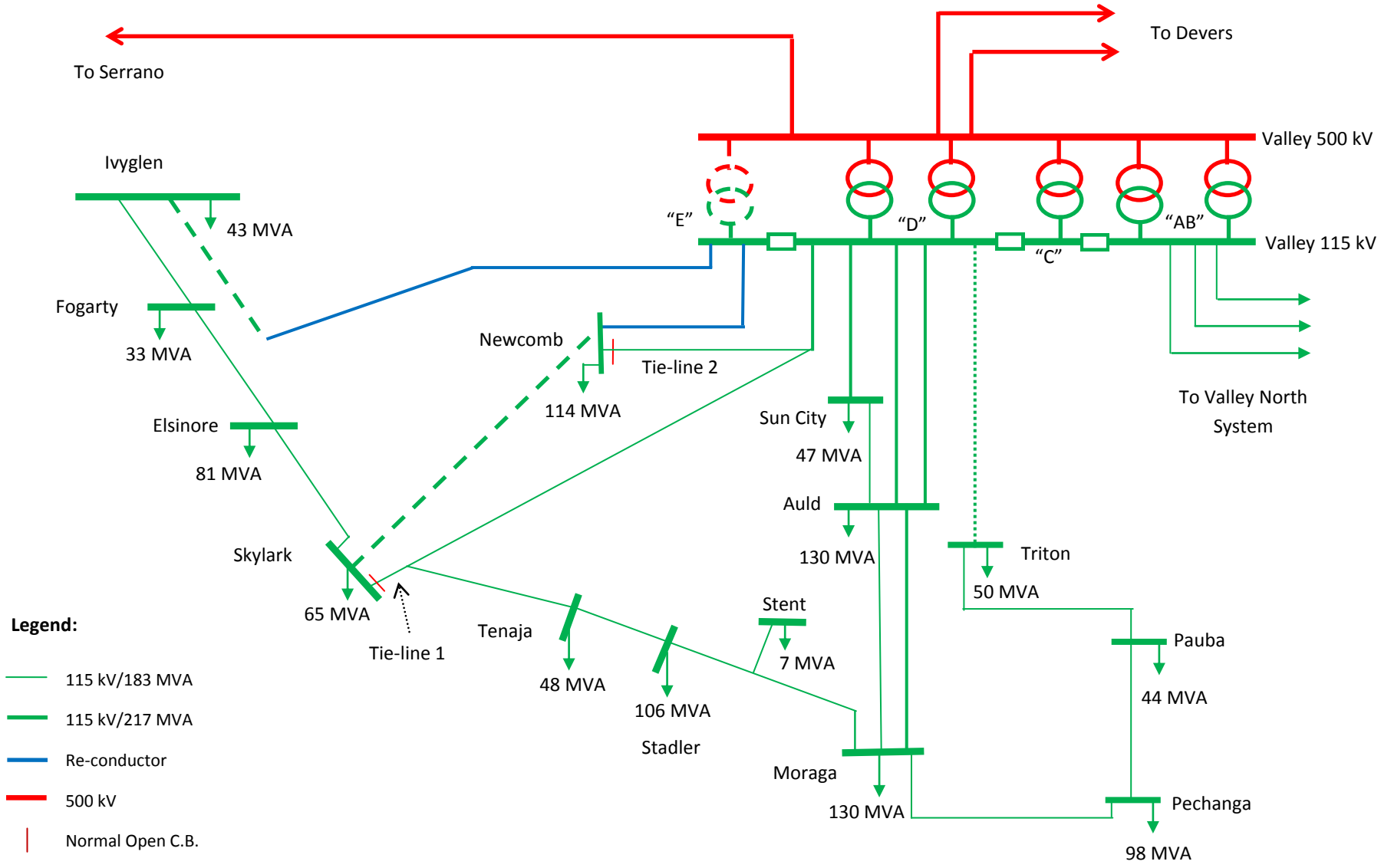
Figure 4.1 Option 2: Install a Sixth Transformer at Valley Substation



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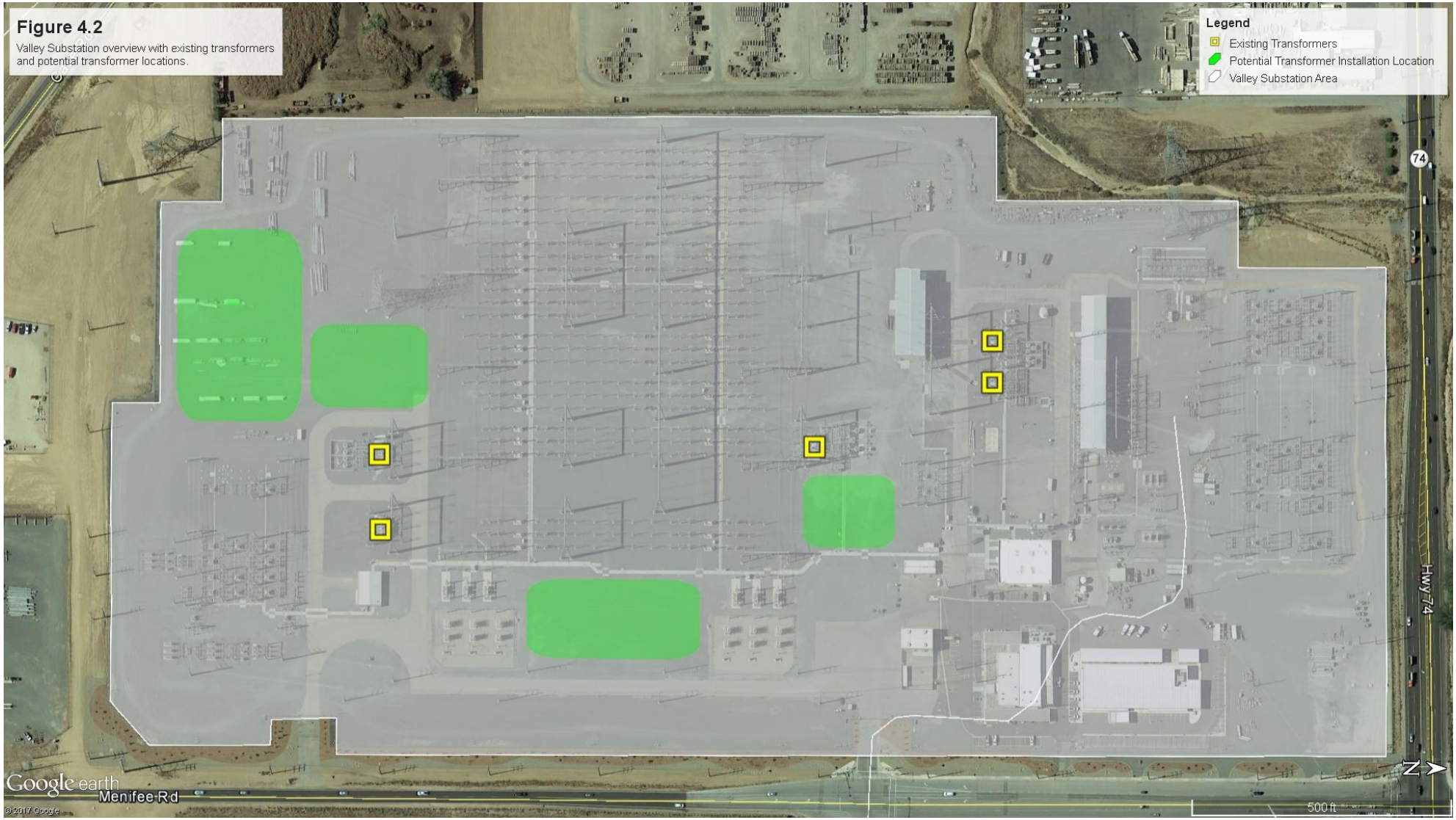
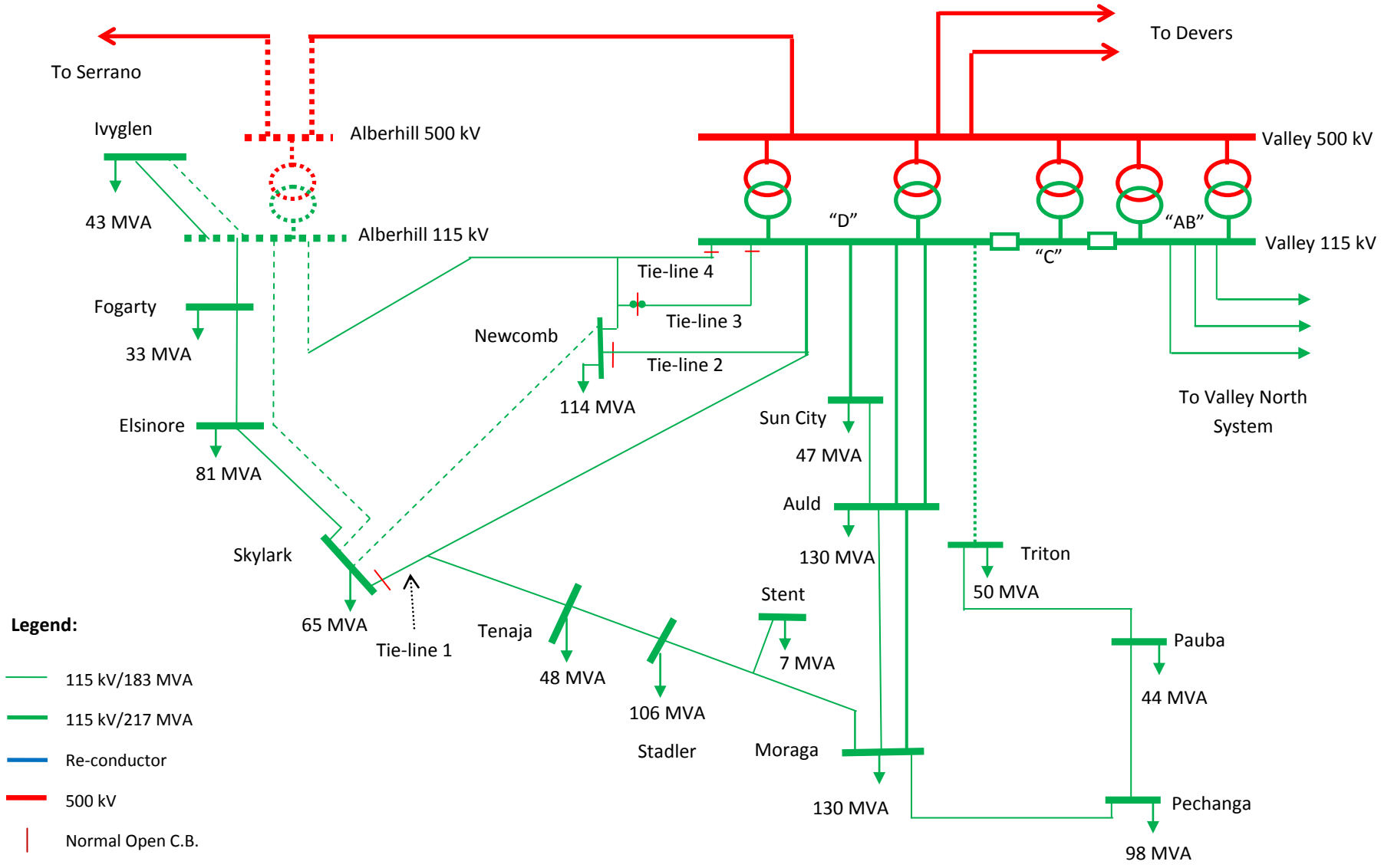


Figure 4.2
Valley Substation overview with existing transformers and potential transformer locations.
Legend
Existing Transformers
Potential Transformer Installation Location
Valley Substation Area
74
Hwy 74
Menifee Rd
Google earth
© 2017 Google
500 ft
N


Figure 4.3
Valley Substation area.
Legend
Valley Substation Area
Google earth
© 2017 Google
N
1000 ft

Figure 5 Option 3: Construct Alberhill Substation without Two Proposed Components



1. The Existing Valley South System includes the Valley South Project that has been approved by the Commission Decision 16-12-001.
2. Load in each substation is based on year 2016 recorded data provided by SCE.

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